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There's a student in my philosophy class who has "real potential." I might express this thought in any of the following ways: "She is potentially a philosopher"; "She is a potential philosopher"; "She has the potential to be a philosopher." The first way uses a cognate of "potential" as an adverb to modify "is." The second ways uses "potential" as an adjective to modify "philosopher." However, the third way uses "potential" as a noun to refer to something that the student has. What kind of thing is this potential? One worry about even asking this question is that this nominalization of the adjective "potential" suggests a metaphysical picture that is an artifact of language. This is even more strongly suggested by the less ambiguous nominalization "potentiality." Once we have the term "potentiality," we have a new kind of entity to countenance, and questions about its nature arise. One might argue, just because we use the word "potentiality," we should not think that it refers to a "thing" that someone can "have."

There is something disingenuous about such an argument. It proceeds as if the adverbial and adjectival uses of "potential" are unproblematic, and questions only arise with the nominalization. But it is not obvious what it means to potentially be something, or what it means to be a potential something. To say that someone "is potentially" a

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philosopher is to talk about a way of being that falls short of actuality.[1] And a "potential philosopher" is not a kind of philosopher at all. So what is it? Each of the three above formulations is a modal claim. If there is anything philosophical puzzling about a potentiality claim, it is not going to go away by translating it into an equivalent modal claim.

In this chapter I defend the existence of potentialities against anti-realist arguments, and make a proposal as to their nature.[2] The proposal, in short, is that potentialities are properties, specifically dispositions, though more needs to be said about properties and dispositions. I will do this in Part I. In Part II, I will address two lines of argument against potentialities: that they are reducible, and that they are causally inert.

1. Properties, Dispositions, and Potentialities

1.1 Properties

Properties are ascribed to things by predicates, such as "is red." We need not assume that there is a one-to-one correspondence between properties and predicates. There can be some predicates that have no corresponding property, like "being non-self-instantiating," and there are most likely properties that do not have any corresponding predicate, if there are undiscovered properties that we have no terms for. I will consider three competing metaphysical views of properties: sets of possibilia (Lewis 1983), universals (Armstrong 1978), and sets of tropes (Williams 1953).

One approach to thinking about properties is to start with particular things—the things that have the properties. We often group things according to their shared properties. So, one way to think about properties is in terms of these groupings. I call this an extensional approach to properties since properties are identified with a set of particulars, or an extension. For example, redness is the set of red things.

1. This is not to say that a potentiality statement cannot be accounted for in terms of the actual: however. such statements would require some analysis along the lines of other "mere" possibility statements.

2. Some of these ideas are discussed in my "Dispositions and Potentialities" (2014).

However, since sets are individuated by their members, formulating the view this way has the implication that redness would be a different property if there were different particular red things. But that seems wrong. So, if redness is a set, it is better to think of it as the set of all the *possible* red things. This is essentially what David Lewis does.

According to Lewis, a property is any class or set of actual or possible entities. One property consists of all the red things in the actual world, and all the possible red things in all of the possible worlds. Another property consists of my pencil, Bill Clinton, and some possible apple in some possible world. On this view, properties are extremely abundant, and there need not be any similarity among their members. However, for any class of entities, there is just one property; triangularity and trilaterality tum out of be the same property on this view. So, this account is inclusive, but also coarse-grained. Entities can be grouped in a large variety of ways. Some of these classes will be arbitrary groupings. Other classes will group entities that are similar in some natural respect. Given the abundance of sets of possibilia, the majority of properties will consist of random, miscellaneous things, and the classes with members that are naturally similar will be an elite minority. Classes of similar entities are importantly different from classes of dissimilar entities, and so there needs to be a way to distinguish these different types of properties. Lewis takes the predicate "— is a natural c1ass" to be primitive, and applicable to some properties, such as the class of red things, but not to others. Implicit in this view is a notion of natural kinds; natural properties correspond to real distinctions in nature. Arbitrary groupings of dissimilar entities, such as the set {my pencil, Bill Clinton, a non-actual apple} are non-natural, disjunctive properties. Between these two extremes, Lewis allows that naturalness can be a matter of degree. For instance, the property of 'being blue or green' seems more natural than the property of 'being blue or square'.

While David Armstrong presents a competing account of properties, he can agree with Lewis that there are a great many classes of entities, and that some of these classes are special in that their members are similar to one another. But Armstrong does not call such classes "properties." He would say that members of natural classes literally "have something in common"-they each instantiate the same universal. Armstrong reserves the expression "property" for these universals. Just as Lewis' "natural properties" correspond to natural kinds, Armstrong's

universals correspond to the true natural kinds that would be discovered by a perfect science. Since these are an elite minority, Armstrong's minimalist view is that properties are sparse. Many of our predicates do not correspond to real properties. A substantial difference between Lewis and Armstrong is how to characterize this elite set of classes of entities. According to Lewis, we can characterize the "elite" classes via the primitive predicate "-is a natural class." According to Armstrong, in order to characterize this set we need to bring in the notion of universals. A third view of properties is that they are sets of tropes (Williams 1953). **In** the language of universals and extensional theories described above, a trope is a particular instance of a property, or the aspect of a particular in virtue of which it is similar to other things in the same natural class. The page that you are reading right now is white (I suppose). That is a property its shares with every other page in this chapter. However, we can refer to this page's whiteness, as distinct from the next page's whiteness, as the white "trope" that this page has. The whiteness that is common to all the pages in the chapter is a set of white tropes. As with Lewis' view, certain sets of tropes are special because they have some irreducible similarity relation to one another. Some versions of trope theory call these sets "properties."

1.1.1 Second-Order Properties

In addition to natural properties, another type of property that is important to this discussion is that of a second-order property. A second-order property is the property of having some property or other which meets some specification. The having of a first-order property, by contrast, does not necessarily involve the having of another property. For example, suppose that color properties, such as 'being red,' or 'being blue,' are first-order properties. A second-order property, then, would be 'being colored'-a property that a thing has just in case it has some color property or other. 'Being red' or 'being blue' are different ways of 'being colored.' In other words, 'being red' and 'being blue' are *determinates* of the *determinable* 'being colored.' Determinables are a kind of second-order property (Yablo 1992; Funkhauser 2006), a property that a thing has in virtue of having anyone among a number of more specific, determinate properties. If having a potentiality is a

matter of having certain other properties, then potentialities would be second-order properties, and their ontological status would be linked to that of second-order properties.

A so-called second-order property might actually be third-order, or higher-order. Perhaps a color property such as 'being green' is not a first-order property at all, but a property that an object has just in case it has some surface-reflectance property or other. Then, the property of being colored would be a third (or higher) order property, that is, the property of having some property. To avoid making assumptions about the basicness of any particular property, the expressions "first-order property" and "second-order property" can be thought of as relative terms. Some potentialities are likely to be higher-order properties. For example, if the potential to be a philosopher is a matter of having other properties such as intelligence and inquisitiveness, but these properties are also possessed in virtue of possessing other properties, then the potential to be a philosopher would be at least third-order.

Armstrong uses the expression "second-order properties" in a different sense, to refer to properties which properties have. On the universals account of properties, universals can have things in common. For instance, some universals are relations. So, 'being a relation' is a property that properties can have. These are what Armstrong calls "second-order properties." Note that this is different from a property that a *particular* has in virtue of having another property. (While a thing has the second-order property 'being colored' in virtue of being red, in Armstrong's terminology, one might say that redness is a first-order property that has the second-order property of *being a color*.) On a sparse universals theory such as Armstrong's, the reality of second-order properties of particulars is called into question. If universals are sparse, we need not posit universals that things have in virtue of having other universals. It would not be in keeping with a minimalist account to say that a red thing instantiates universals for being colored, being red, being a certain shade of red, in addition to being a certain surface reflectance. There might be just one universal that makes all of these predications true—they might all have the same "truth-maker." A thing's so-called "first-order" property might be the only truth-maker we need for all of our predications of it.

According to trope theory, second-order properties would be sets of tropes. So "being colored" would be the set of all the sets of color

tropes. A particular trope would be a color trope in virtue of being a red trope, say. That seems to cash out a sense in which something could have a second-order property, being colored, in virtue of having a first-order property like being red.

On an extensional account of properties, a given property is not essentially first, second, or higher order. "Being red, orange, yellow, green, blue, indigo, or violet" seems like a disjunctive first-order property. However, if it has the same extension as the apparently second-order property "having some color property or other," then it is the same property. Likewise, "the property of having property P" would seem to be a second-order property. However, it would necessarily have the same extension as property P, an apparently first-order property. So "P" and "the property of having P" are but two names for the same property. On this account, it seems that the "order" of the property is a function of the way it is characterized, rather than something about the nature of the property itself. Therefore, it makes more sense to talk about first and second-order characterizations of properties for an extensional account. However, one can still do some justice to the idea of a second-order property by talking about properties whose canonical characterization is second-order. This might be the case if the most salient point of resemblance between members of a class is the possession of various properties which meet a certain specification.

1.1.2 Real Properties

Now that the major metaphysical views about properties are on the table, we can return to questions of existence and reality. What does it mean for a property to exist, or to be real? According to Armstrong, it is a matter of the existence of a universal. But how do we know which universals exist? Armstrong accepts an instantiation condition, so a universal does not exist unless some actual particular instantiates that property. But that does not settle the matter, for it is not obvious which properties are instantiated. A number of things may appear to be jade, but are not instantiating the same universal if some of them are nephrite and others of them are jadeite. The real properties of things are the subject of scientific investigation, not something we can discern from ordinary predicates and folk-descriptions of things. A consequence of this view is that many of our predicates

do not correspond to real properties. Given the underlying differences in things that appear to be the same shade of red, it is unlikely that "red," let alone "the potential to be a philosopher," picks out a genuine property. However, if there are any fundamental physical potentialities, like electric charge for instance, then a universals account could allow that such potentialities exist.

On trope theory, a property exists whenever you have a set of similar tropes. Since a set can be a singleton, the existence of any trope entails the existence of a property. However, trope theory as such does not indicate which tropes exist. If a predicate is aptly applied to something, there is nothing about trope theory per se to tell us there is no corresponding property. Of course, one could have a minimalist trope theory, akin to a minimalist universals theory. But if it is true that one way for something to be is for it to have the potential to be something else, then a potentiality trope, and a potentiality, exist.

Lewis' extensional theory of properties is the most liberal with respect to property existence. On this view, for any set of possible things, there is a property. Furthermore, the things need not actually exist (in this world). This view has no effective instantiation condition, which enables us to talk about properties that nothing actually has. The only "properties" that do not exist are sets that have no possible members. The potentiality to be a philosopher is a property because it is possible that there are some people who could be philosophers in the future. Since properties are so easy to come by on an extensional account, perhaps when one asks "are potentialities real?" she is really interested in whether potentialities are "natural," and whether any of their instances (members) exist in the actual world. The question becomes: Do any actual things have potentialities, and if so, do they share a certain natural respect of similarity? The answer to that might depend on not only on the nature of potentiality and the particular potentiality in question, but also on one's understanding of what it means to be natural. If being natural is a matter of degree, the equation of "natural" with "real" has the odd implication that reality comes in degrees.

To summarize, none of the three metaphysical views about properties considered rule out the existence of potentialities. On Armstrong's theory of universals, potentialities, like other properties, would be sparse at best. Trope theory would offer the less-than-helpful suggestion that there are potentialities if there are potentiality tropes. On

Lewis' extensional view, potentialities, like other properties, would be abundant, though not necessarily natural. So, anti-realism about potentialities does not follow from major approaches to the metaphysics of properties. But before I examine more targeted arguments against potentialities, I need to say more about them. But since I am giving a dispositional account of potentialities, I need to say more about dispositions first.

1.2 Dispositions

When someone has a disposition, he or she is prone to act in certain ways in certain circumstances. A cowardly person is disposed to flee from danger, for example. A sociable person is disposed to seek the company of others. Physical objects can also have dispositions. Fragile objects are disposed to break when struck. Elastic objects are disposed to stretch when pulled. As with ordinary language, science, too, is rife with dispositions talk. A substance is volatile or reactive if it is disposed to enter into reactions with other substances. A material is conductive if it is disposed to transmit an electric charge. An element is unstable if it is disposed to decompose. An organism is fit for a certain environment if it is disposed to survive in that environment. Numerous synonyms and near-synonyms, such as "power," "capacity," "tendency," and "predisposition" expand the range of dispositional locutions even further.

It is widely acknowledged that dispositions-talk is ubiquitous. However, it is a matter of some controversy how this talk is to be understood. On a realist account, a disposition is a property, or a quality that things can have, like redness or solidity. A disposition has a characteristic manifestation. For example, the characteristic manifestation of fragility is shattering, and the characteristic manifestation of cowardliness is avoidance of danger. The manifestation need not occur for the object to have the disposition. A glass can be fragile even if it never shatters. A manifestation of a disposition occurs (at least typically) when the object with the disposition is subject to certain circumstances. The fragile glass shatters when it is struck. The circumstances in which the manifestation occurs are called "the circumstances of manifestation." They include not only the salient "trigger" for the manifestation (the striking), but also the necessary background

conditions, such as ambient temperature and gravitational forces. In some cases, the manifestation will occur at the location of the disposed object itself. In the case of the fragile glass, the shattering occurs where the glass is. However, in other cases, the "locus of manifestation" may be elsewhere. For example, if something is provocative, the manifestation will occur in the thing provoked.

Given that a disposition is associated with a manifestation, and with circumstances which trigger the occurrence of this manifestation, there is a natural association between a statement attributing a disposition to a thing and a certain conditional statement: If the conditions were to obtain, the manifestation would occur. For example, the statement "This glass is fragile" bears some important relation to the statement "If this glass were struck, it would shatter." An attribution of a disposition to some object licenses inferences about what will happen in various circumstances. These inferences may be defeasible, but the ability to make these inferences is what makes dispositions talk so useful, if not indispensable. We frequently have pressing reasons to be concerned about predicting what things will do in various circumstances. It is important to know what is poisonous and what is nutritious, which animals are aggressive, and which situations are dangerous. We are interested to predict the behavior of our fellow human beings, and so describe them as friendly, hostile, irritable, shy, ambitious, trust-worthy, and so on. Disposition ascriptions are an important means of communicating our understanding of what to expect from the things in our environment.

Furthermore, when an object is disposed to behave in a certain way in certain circumstances, it is often thought that there is something about the object "in virtue of which" this is so. The fragile glass is disposed to shatter when struck due to some feature of the glass. The silicon bonding in the glass is such that, if an excessive strain is placed on these bonds due to warpage of the glass, some of the bonds will break, starting a chain reaction of bonds breaking. Hence, the glass shatters when struck. This type of molecular bonding is the causal basis of the glass's fragility. A disposition's causal basis is a property of the disposed object which is causally efficacious for the disposition's manifestation, if and when such manifestation occurs. Dispositions and causal bases do not typically have a one-to-one correspondence. Crystal wine glasses and egg shells are both fragile, but have very different structures and constituents. Presumably, these things have

different properties in virtue of which they are prone to break when struck. That is to say: the causal basis of fragility in a wine glass is a different property than the causal basis of fragility in an egg shell. Or consider electrical conductivity and thermal conductivity, two different dispositions which have the same causal basis in metals. Furthermore, there may be ungrounded dispositions that have no causal bases at all (McKitrick 2003b).

1.2.1 Dispositional and Categorical Predicates

Dispositional predicates are conceptually associated with manifestations, circumstances, and conditionals. Non-dispositional, or categorical predicates do not have these associations. As paradigm examples of categorical predicates, philosophers sometimes offer shape predicates. Arguably, to say something is square is not to say anything about what it would do in particular circumstances; 'being square' has no associated manifestation or triggering event. Arguably, categorical predicates do not have the relevant relation to conditionals.[3] As Elizabeth Prior notes "dispositional ascription sentences possess a relationship to certain subjunctive conditionals not possessed by categorical ascription sentences" (Prior 1985, 62).

Most philosophers acknowledge a distinction between dispositional and categorical predicates. Nevertheless, this characterization is rough, the nature of this conceptual association is left vague, and how to categorize a given predicate may be a matter of dispute. According to Goodman, for example, "almost every predicate commonly thought of as describing a lasting objective characteristic of a thing is as much a dispositional predicate as any other" (Goodman 1983: 41). The predicate "is square" seems categorical, but it is associated with certain conditionals, such as "if you try to put it in a round hole, it will not fit."

Some philosophers claim that the dispositional/categorical distinction ends there, as merely a distinction among predicates, which

3. Some argue that all predicates are related to conditionals in the relevant way, undermining this way of distinguishing categorical from dispositional properties (Mellor 1982). One could reply by arguing that dispositional and non-dispositional predicates differ in the ways they are related to conditionals. However, I will not pursue such arguments here, for the claim that there are some non-dispositional predicates is not central to my main thesis that potentialities are dispositions.

does not correspond to any interesting metaphysical distinction among properties. Sidney Shoemaker, for example, says "I think that the term 'dispositional' is best employed as a predicate of predicates, not of properties" (1980: 211). According to Shoemaker, what determines the identity of a property "is its potential for contributing to the causal powers of the things that have it" (1980: 212). Though Shoemaker would resist, one might want to describe his view by saying that all properties are dispositional properties. At the other extreme, David Armstrong claims that all properties are categorical properties (1996: 16). On Armstrong's view, these categorical properties stand in Necessitation relations, thereby establishing lawful connections between instantiations of universals, and leaving no role for dispositions. He acknowledges that some properties are picked out by disposition terms, but claims that such terms simply provide us with a useful way of speaking of categorical properties. As Armstrong puts it, the dispositional/categorical distinction is a "verbal distinction that cuts no ontological ice" (1973: 15).

Clearly, Armstrong thinks that the distinction between properties makes sense—he just thinks that one of the categories is empty, and so if a non-trivial distinction is wanted, then it must apply to predicates. Although Shoemaker wants to reserve "dispositional" as a predicate of predicates, he can agree with Armstrong that the distinction between properties makes sense-he just disagrees about which category is empty. Questions about whether the world contains dispositions, categorical properties, or both are metaphysical, not merely linguistic. Categorical properties, then, are properties which do not have the relevant associations with manifestations, circumstances, and conditionals. Along these lines, Stephen Yablo offers as an intuitive characterization, "a property is categorical just in case a thing's having it is independent of what goes on in non-actual worlds" (1987: 306).[4]

Naturally, there is room for dispute as to which properties are categorical and which are dispositional. Hugh Mellor argues that even shape properties are dispositions. For example, he says that triangularity is the property of being disposed to be counted as three-angled (1974: 171). Similarly, Goodman says "a cubical object is one capable of fitting try squares and measuring instruments in certain ways" (1983:

4. Yablo goes on to argue that this characterization is inadequate.

41). I am not going to dispute these claims here; I am just trying to explain the distinction between dispositional and categorical properties, without taking a stand as to which (if any) specific properties fall into each category, or if the categories are exhaustive.

1.2.2 Marks of Dispositionality

To summarize the key points of this section so far, a disposition such as fragility can be characterized as follows. A fragile glass will shatter if you strike it hard enough. Fragility is the glass's *disposition,* shattering is the *manifestation* of the disposition, and being struck is the *circumstance of manifestation.* The underlying cause of the glass's shattering constitutes the *causal basis* of the glass's fragility. The glass can remain fragile even if it never shatters. One can say of the fragile glass, with certain qualifications, that if it were struck, it would shatter. This characterization suggests certain "marks of dispositionality," according to which a property is a disposition if it:

(1) has a characteristic manifestation;
(2) is such that certain circumstances can trigger that manifestation;
(3) can be possessed without the manifestation occurring;
(4) is instantiated by things of which a conditional of the form "if it were subject to the circumstances, it would exhibit the manifestation" is generally true; and
(5) can be accurately characterized with an expression of the form "the disposition to produce the manifestation in the circumstances" (McKitrick 2003a).

I take it that these conditions are jointly sufficient for dispositionality, but I am not committed to their being individually necessary. The association with conditional statements (my fourth mark) has received extensive discussion in the literature. Later, I will discuss numerous counterexamples to conditional analyses of dispositions. These counter-examples suggest that analyzing a disposition ascription in terms of a conditional statement will always be fraught with difficulties. One may question whether an association with a conditional is a mark of dispositionality at all.

However, the fourth mark of dispositionality is carefully hedged. I claim that if a property is a disposition, then it is instantiated by things of which a conditional of the form "if it is subject to the circumstances, it exhibits the manifestation" is *generally true,* allowing for exceptions. That is to say, a thing might have the disposition in question even if the relevant conditional is not true of it. For example, "if you drop it, it will break" is not true of the carefully packed glass, but nevertheless, the glass is still fragile. The marks of dispositionality apply to property types, while typical counter-examples to conditional analyses feature particular property tokens or tropes. While there may be particular dispositional tropes of which the conditional is not true, that does not show that the general property does not bear the marks. So, even though a particular glass may have its fragility masked by careful packing, the general property 'fragility' still:

(1) has a characteristic manifestation-breaking;
(2) is such that certain impacts can trigger that manifestation-breaking;
(3) can be possessed without breaking;
(4) is instantiated by things of which a conditional of the form "if it were struck, it would break" is generally true; and
(5) can be accurately characterized with an expression of the form "the disposition to break when struck."

If a property was never instantiated by anything of which the relevant conditional were true, that would not be a clear case of dispositional property. But I do not claim that the truth of the conditional is necessary or sufficient for a property to be a disposition.

If a property bears most of the marks, I claim that is some evidence that the property in question is a disposition. As an example of a disposition that lacks one of the other marks, consider stability, which:

(1) has a characteristic manifestation-maintaining structural integrity, or staying intact;
(2) has circumstances of manifestation-various stresses to this structural integrity. (Note that "stability" will always be relative to certain kinds of stress-stable in wind, stable in earthquakes, etc.);

(4) is instantiated by things of which a conditional of the form "if it were stressed, it would stay intact" is generally true; and
(5) can be accurately characterized with an expression of the form "the disposition to stay intact when stressed."

Note that the third mark, the possibility of possession without manifestation, is absent. Stability is a disposition that cannot be possessed without being manifest-a structure that is not manifesting stability is not stable. Others argue that dispositions like radioactivity manifest spontaneously and thus lack stimulus conditions (Vetter 2010). **In** those cases, the second mark-having circumstances of manifestation would be absent.

Perhaps these counterexamples seem to reveal the shortcomings of the marks of dispositionality. However, these marks do not constitute a decision procedure for determining whether a disposition is instantiated in a particular instance. Instead, their purpose is to help determine whether a general property is dispositional. Here, I use them to argue that potentialities are dispositions. Marks of dispositionality provide evidence that a property is a disposition, but do not constitute a reductive analysis of disposition ascriptions.

1.2.3 Accounts of Dispositions

Various accounts of dispositions have been offered which are consistent with these marks of dispositionality. On some views, dispositions are fundamental, irreducible powers (Molnar 2003). While such powers cannot be analyzed in terms of anything more basic, proponents of such views argue, contrary to Hume, that it is a concept that we acquire by experience, and that we can characterize roughly as outlined above. According to other views, to ascribe a dispositional predicate to something is tantamount to asserting a certain subjunctive conditional. For example, "x is fragile" is said to be true if and only if a conditional such as "if x were dropped, x would break" is true (Gundersen 2002; Choi 2006). According to a simple conditional analysis:

> *x* is disposed to exhibit manifestation M in circumstances C iff (if *x* were in C. *x* would exhibit M).

The idea that dispositions have causal bases suggests a second-order property view of dispositions, according to which having a disposition is having some property which would be causally efficacious for its manifestation. This can be more formally stated as follows:

> *x* has a disposition D to exhibit M in C iff *x* has some property P which is a causal basis for giving M in C (where property P is a causal basis of D iff P is a property of *x* which would be causally efficacious for M in C). (Johnston 1992: 230)

Lewis's revised conditional analysis (1997) is also a second-order property view. The idea, somewhat simplified, can be put as follows:

> *x* has a disposition at time *t* to give M in C iff *x* has intrinsic property *P,* and if *x* were to be in C at time *t* and retain *P,* then *P* and C would cause M (1997: 157).

Manley and Wasserman's "PROP" offers a conditional analysis, which relaxes the stringent requirement that a disposed object must manifest its disposition in its circumstances of manifestation, and counts an object as having a disposition as long as the disposed object manifests often enough. More formally:

> *x* is disposed to M when C iff *x* would M in a suitable proportion of C-cases (2008: 76).

It is not my objective to endorse and defend a particular account of dispositions here. I am concerned with these analyses, however, to the extent that they challenge a realist dispositional account of potentialities. Accordingly, I will argue against the idea that any of these accounts facilitate a reduction or elimination of dispositions or potentialities from our ontology. But first, I will make the case that dispositions are potentialities.

1.3 Potentiality

I began with the example of my student who has philosophical potential. Here are a few more examples of potentiality claims: An embryo

is a potential person; a patient has the potential to be conscious; a caterpillar is potentially a butterfly; an acorn has the potential to be an oak tree. In general, when one says *"x* is potentially F," *"x* is a potential F," or *"x* has the potentiality to be (an) F," 'F' refers to either a property that *x* can have, or a class or kind of which *x* can be a member: The occurrence or state of affairs, *"x* being F," is the actualization of *x's* potential to be F. One way for a thing to become a member of a kind is by acquiring certain properties that are characteristic of that kind. In that case, the two ways of being potentially F (where F is either a property that one can have or a kind of which one can be a member) come to essentially the same thing, slightly complicated by the fact that kind membership may require having more than one property.

Another common use of the term "potentiality" that should be kept in mind might be called "epistemic potentiality." When you think there is some chance that something has a certain property, you might say that it "potentially" has that property. For example, suppose your perfectly healthy friend, John, is in the next room and you are not sure whether he is asleep or awake. You might express you judgment about John by saying "John is potentially conscious." But John is not like the coma patient, whose capacity for future consciousness is in question. So, presumably, you are not making a claim that you take for granted, that John, who is now sleeping, has the potential to be conscious in the future. Rather, you are saying that, as far as you know, John is conscious right now.

This sense of potentiality would seem to have little to do with the relevant potentialities of a student, embryo or patient. However, it may be important to keep it in mind, lest we confuse our uncertainty as to whether something already has a certain property with the judgment that it could possibly acquire that property in the future. Perhaps this conflation is going on in Noonan's "An Almost Absolute Value in History," where he compares aborting a fetus to shooting into some bushes where a hunter might be (Noonan 1970). In both cases, you could say "there is a potential person there." However, in the case of the hunter, the potentiality is epistemic, whereas in the case of the fetus, on the most plausible interpretation of the claim "there is a potential person there," the potentiality is metaphysical, not merely epistemic.

1.3.1 Potentialities Are Dispositions

Potentiality claims and disposition claims are importantly similar. To talk about what something has the potential or disposition to do is to make a claim about a future possibility-the "threats and promises" that fill the world (Goodman 1983: 41). Potentiality-talk and dispositions-talk are often interchangeable. When *x* is potentially F, one can say that *x* is *disposed* to be F, where "being F" is the manifestation of *x's* disposition. Disposition ascriptions can likewise be put in terms of potentiality: If the bomb is explosive, it has the potential to explode; the fragile glass has the potential to break. Shoemaker's classic paper uses the terms "disposition" and "potentiality" interchangeably (1980: 213). Granted, potentiality-talk and dispositions-talk are not perfectly interchangeable. You might say that an oak tree is potentially a table, but that it is not disposed to be a table. And you might have the potential to be a drug dealer, even if you would not say that you are disposed to be a drug dealer.[5] Many disposition ascriptions in ordinary language suggest a stronger tendency, a higher probability of the manifestation occurring, than do the analogous potentiality ascriptions.

However, such observations are consistent with potentialities being dispositions nevertheless. The ordinary-language connotation of many disposition claims may be that the manifestation has a high probability of occurring, but this is defeasible. Some particular instantiations of dispositions are unlikely to manifest. For example, a nuclear bomb has a disposition to explode, but let us hope that is unlikely to happen. Furthermore, it is a misnomer to talk of "the" disposition to so-and-so, for the manifestation alone does not uniquely specify a disposition. Two different dispositions could have the same manifestation, but not be the same disposition. Someone who gets red-faced whenever she is complemented is not manifesting the same disposition as he whose ruddy complexion reflects his ample consumption of alcohol. What differentiates these dispositions is that they have different stimuli, or circumstances of manifestation. Granted, there are some

5. Thanks to the audience at my presentation of an earlier version of this paper at the University of Nebraska for these examples. especially Reina Hayaki for suggesting the right response.

cases where the expressions "the potential to be F" and "the disposition to be F" pick out different properties. However, even in those cases, "the potential to be F" still picks out a disposition, since the expression "the disposition to be F" is ambiguous.

Though the imperfect interchangeability of dispositions-talk and potentiality-talk is suggestive, a better way to gauge whether potentialities are dispositions is to consider whether they bear the marks of dispositionality. Consider an embryo's potential for rationality:

(1) It has a manifestation-being rational;
(2) This manifestation will occur given certain (albeit very complicated to specify) circumstances of a favorable environment, nurturance, and so on;
(3) An embryo can possess the potential to be rational without being rational;
(4) A certain conditional is, other things being equal, true of the embryo: If a certain favorable environment and nurturance were to obtain, the embryo would become rational; and
(5) It is not inappropriate to call the potential for rationality "the disposition to become rational."

It is also worth noting that, like many dispositions, potentialities often have causal bases. An embryo's potential to be rational is not a brute, fundamental feature, but is presumably based on its genetic code and other biological factors.

Given that potentialities are dispositions, it is not clear whether dispositions and potentialities are coextensive, or whether potentialities are a subset of dispositions. Perhaps potentialities are a distinctive subset because the locus of manifestation is always where the object that had the potentiality is located. Given that the manifestation of *x's* potential to be F is *"x* being F," it may seem as though the manifestation of *x's* potentiality must occur where *x* is. When *x* manifests *x's* potential to be rational, "being rational" happens where *x* is. This is not true of dispositions in general. A thing can be disposed to have an effect on something else: roses are disposed to smell sweet, provocative capes make bulls charge, and soporific lullabies put babies to sleep. In those cases, the locus of manifestation is not where the disposed object is.

However, a potentiality's manifestation is not always a matter of the individual who had the potential instantiating a property. One reason for this is because a thing can have the potential to become a different thing, changing its characteristics to such an extent that it is no longer the same individual anymore. Of course, whether this happens will depend on your views of diachronic identity, or what changes an individual can survive over time. Consider the acorn's potentiality to be a tree. The manifestation of that potentiality is something 'being a tree.' But it is not clear whether the individual that is a tree now is numerically identical to the original acorn. Furthermore, you could bum the tree, so it has the potentiality to be a pile of ashes. But if that happens, arguably you do not end up with something that is at once the acorn, the tree, and a pile of ashes. To consider another example, when an unfertilized egg realizes its potential to develop into a rational being, it is not clear that the original ovum and the rational being are the same individual. Or consider a case of fission where, for example, one plant can have the potential to. become several plants. If we divide and root several parts of the original plant, arguably, the original plant has ceased to be, and whatever potentialities it had are being realized by its descendants.

A way to deal with these sorts of cases is to say that, when a potentiality to be F is realized, either the individual who had the potential *or its causal descendant* is F. To make good on this proposal, one would have to cash out the notion of a "causal descendant," which may prove difficult. Surely, one's children are candidates for being one's causal descendants. But while parents may try to live vicariously through their children, your daughter becoming a doctor would not realize *your* potential to be a doctor. Perhaps it is better to relinquish the notion that the locus of manifestation for a potentiality is where the potentiated individual is, for there are other sorts of counter-examples to this claim.

For example, when you realize a potential to *do* something, such as score a goal, the effect that you have does not always happen where you are. Also, some people have the potential to be dangerous, funny, or annoying, but when someone manifests being dangerous, funny, or annoying, it is often someone *else* that is hurt, laughing. or annoyed. Having the potential to instantiate a relational property is a similar sort of case. Consider the potential to be President of the United

States. When that potentiality is actualized, it is the person who had the potential that now has the property of being the President of the United States.[6] However, since having that property depends on complicated historical and social relations that go beyond the bounds of the individual, it is not clear that the manifestation is entirely located where the individual who had the potential is.

Another idea about how to distinguish potentialities from other dispositions is that potentialities cannot be possessed *while* manifesting. Generally, when a disposition manifests, the disposed object might continue to instantiate the disposition, or it might not. Sometimes, a thing loses a disposition when it manifests it, or even ceases to exist. The bomb is no longer explosive after it explodes. The match is no longer flammable once it has burned. The disposition, in effect, gets spent, and is no longer possessed. Elastic bands, on the other hand, are still elastic when stretched. Magnets are still magnetic even when they are manifesting their magnetism. What about potentialities? Does a person have the potential to be a person? Does a living thing have the potential for life? Perhaps, when potentialities have been and continue to be actualized, it is often no longer appropriate to say that they are possessed. However, there are exceptions. Someone may have the potential to grow, or to learn, realize those potentialities, and yet still have the potential to grow or learn. So, it is false to say that a potentiality is never both actualized and possessed. Sometimes, saying that an F is potentially F is misleading and inappropriate, but perhaps it is not false.

In sum, potentialities are dispositions whose manifestation is a matter of the disposed individual acquiring a property and/or becoming a member of a kind. Typically, the manifestation occurs where the disposed individual is. And perhaps potentialities often cease to be instantiated once they are manifest. However, manifestations of dispositions also involve things acquiring properties. Furthermore, like dispositions, the manifestation of a potentiality can happen either where the potentiated object is or elsewhere, and potentialities can be possessed while their manifestations are occurring. Consequently, potentialities do not seem to have any essential characteristics that distinguish them from dispositions. So there is no clear reason to

6. Thanks to Harry Ide for these examples.

distinguish them. Lacking any reason to think that potentialities are different from dispositions, we can assume that what is true about dispositions is true about potentialities, and reasons to think that dispositions are real are reasons to think that potentialities are real.

2 Realism Versus Anti-realism About Potentialities

2.1 Reduction

We employ numerous and diverse dispositional and potentiality concepts. What does that tell us about the world? I hope it is not too naïve to think that long entrenched traditions of employing certain concepts with apparent success gives some reason to think that those concepts are related to the world in meaningful ways. Perhaps, if our potentiality ascriptions are true, then the potentialities we ascribe to things exist, in whatever sense properties exist. This assumption stands in opposition to a notable philosophical project of the last century, to semantically reduce disposition ascriptions (Schrenk 2009). That reduction can be applied to potentiality claims as well. If the reductionist project is successful, one could say that potentiality ascriptions are true, but not because potentialities exist, but because the ascriptions are merely ways of asserting something that is consistent with the non-existence of potentialities, such as a conditional, or a claim about other sorts of entities. Just as the claim that "The average American woman has 1.5 children" does not commit one to the existence of the average American woman nor half-children, one may argue that truth of claims such as "Alice is a potential philosopher" and "an acorn is potentially an oak tree" does not commit one to the existence of potentialities.

So, one reason to be anti-realist about potentialities is because you think that potentiality claims can be reductively analyzed and eliminated in favor of other sorts of entities. I have suggested that a prima facie reason to think that a property exists is that we consistently apply a certain predicate. But this prima facie reason is defeasible. As Shoemaker writes:

> … we have *a* notion of a property … which is such that not every phrase of the form 'being so and so' stands for a property

> which something has just in case the corresponding predicate of the form 'is so and so' is true of it, and is such that sometimes a predicate is true of a thing, not because (or only because) of any properties *it* has, but because something else, perhaps something related to it in certain ways, has certain properties (1980: 209).

The assumption that we are referring to a property can be undermined if a reductive analysis of disposition and potentiality claims can succeed. As Troy Cross writes:

> if, as it was hoped. subjunctive conditionals could be given truth conditions in purely categorical terms, dispositions could be eliminated from fundamental ontology and replaced with purely categorical properties, or perhaps categorical properties together with laws of nature (2012: 115).

2.1.1 Simple Conditional Analyses

A common reductive strategy has been to analyze disposition claims in terms of conditional statements. For example:

(A) *x* is disposed to exhibit manifestation M in circumstance C iff
(B) if *x* were to be subject to C, *x* would exhibit M.

Similarly for potentialities, the analysis would be:

(A)^{P} *x* has the potential to become F in circumstance C iff
(B)^{P} if *x* were in C, *x* would become F.

(If, as argued above, potentialities and dispositions are co-extensive, these come to the same thing. However, in order to demonstrate that what is true of disposition claims is also true of potentiality claims, I will consider each type of claim in tum.) The reductionist would argue that since the analysans in either case do not mention dispositions or potentialities, but only particulars, circumstances, and properties, as long as we have an account of what it means for the relevant kind of conditional to be true, we have an account of how the

disposition or potentiality statement can be true without positing any dispositions or potentialities.

A common response to such reductionist strategies is that conditional analyses are false. One initial problem for a conditional analysis is trying to accurately specify the appropriate conditional. A few moments of reflection is enough to realize that "if you drop it, it will break" is a woefully inadequate and overly simplistic analysis of fragility. Such a conditional will not be true of a fragile glass if you drop it a fraction of an inch, drop it onto a fluffy cushion, or drop it in a low gravity environment. Dropping is not even necessary for a fragile glass to break—you can strike it where it sits. But if you strike it softly with a feather, it will not break. However, a very powerful blow could break even non-fragile things. In order to state a conditional that is true of a thing if and only if it is fragile, you would have to figure out the precise conditions under which fragile and only fragile things break—no easy task.

If it is difficult to specifying the conditions under which fragility manifests, it seems virtually impossible to specify in detail the circumstances of manifestation for certain potentialities like potential for intelligence. If the view is that something has a certain potential if and only if a certain conditional is true, then it is fair to expect to be told what that conditional statement is. But, in order to say what that· conditional statement is, one would have to articulate the precise conditions which are sufficient for a thing to realize its potential. It would be inadvisable to make them too precise, lest you deny that potentiality to other things which may aptly be said to have it.

Even if you figure out the right conditional, a conditional analysis is still challenged by a number of counterexamples. One such counterexample is a "mask" (Johnston 1992) or "antidote" (Bird 1998) which challenges the necessity of the analysis. For example, imagine a fragile glass that is packed so that it has internal supports to prevent the glass from warping and therefore from shattering when struck. If you struck the packed glass, it would not shatter. The disposition ascription (A) is true-the glass is fragile-but the conditional claim (B) is false.

Surely, a thing's potentiality can be masked as well. An acorn could be placed in fertile soil, but if it were coated in hard plastic, the seed could not break through and grow. In that case, the acorn might still have the potential *(Al* to become an oak tree, but the associated

conditional (B *l* is false. The general problem is that, even if the specification of the circumstances of manifestation articulates all that must be present in order for the thing to realize its potential, the specification cannot rule out all of the possible factors which may interfere. To add to the analysis "and nothing interferes" would trivialize it. It would be a matter of explicating *"x* has the potential to be F" as *"x* will become F, unless it does not."

One counterexample to the sufficiency of a conditional analysis of dispositions is the case of so-called "mimics" (Smith 1977). A mimic is something that lacks a certain disposition, but for idiosyncratic reasons, acts as if it does. Odd circumstances result in a certain conditional being true of something that nevertheless fails to instantiate the requisite disposition. Smith's example is a wooden block that is brought to Neptune, where something about the atmosphere results in the block shattering when it is dropped. The conditional (B) "if you had dropped it, it would have broken" is true of the block on Neptune, but intuitively, the corresponding disposition ascription (A) is false; the block is not fragile.

Interestingly, some of the most talked-about counterexamples to the moral relevance of potentiality appear to be variations on mimicking cases. Consider "super kitten," a kitten which intuitively does not have the potential to be a person, but which could be injected with a special serum that would tum it into something with the characteristics of a person (Tooley 1972). A kitten receiving such extraordinary treatment is perhaps analogous to a wooden block being taken to Neptune, in the sense that, in both cases, unusual circumstances could lead to unusual results, and this challenges our application of the concepts in normal circumstances. In that case, the potentiality ascription $(A)^P$ is false, but the associated conditional $(B)^P$ turns out to be true.

Another purported counterexample to the conditional analysis is the case of so-called "finkish" dispositions (Martin 1994; Lewis 1997). Once we note that things can acquire or lose dispositions, we can generate counterexamples to a conditional analysis by supposing that these gains and losses can occur when the circumstances of manifestation occurs. An example of a finkish disposition is the fragility of a glass which is protected by a wizard who will immediately render it non-fragile if it is ever struck. A less fantastical example of a finkish disposition is the instability of the DNA molecule. DNA is susceptible to breaking up due to forces, such as radiation and heat.

However, forces which would break the molecule also trigger mechanisms within the cell nucleus that maintain the molecule's structure (Tornaletti and Pfeiffer 1996). An object has a "finkish disposition" if that object has a disposition which it loses in what would otherwise be the circumstances of manifestation. If the disposition D is finkish, the same C that would normally cause *x* to exhibit M instead causes *x* to lose D before it can exhibit M. In this case, (A) is true: *x* does have the disposition. But (B) is false: If *x* were subject to C, it would not exhibit M. So, the analysis fails to state a necessary condition for *x's* having a disposition.

A potentiality could also be finkish. Consider again an acorn with the potential to become an oak tree. The circumstances of manifestation of that potentiality include dropping onto fertile soil. But suppose the gardener does not want any more oak trees in the yard, so he crushes any acorn that drops. The circumstances that would normally result in an acorn manifesting its potential lead to its destruction. If the acorn has the potential to be an oak tree, that is a case in which the potentiality claim $(A)^P$ is true, but the associated conditional $(B)^P$ is false.

A similar type of counterexample is called "altering" (Johnston 1992). A glass swan is fragile, but a vigilant monitor equipped with a laser beam will rapidly melt the swan the moment it is struck. The conditional (B) is false, but the swan is fragile (A). Another example is the shy, but intuitive chameleon (Johnston 1992). The chameleon is green and thus disposed to look green, but before anyone can tum on the light and look at it, it blushes red. In both these cases, the conditions of manifestation are such that, if they were realized, the object would "alter" and lose its disposition.

A thing can also finkishly lack a disposition. When green, the chameleon does not have the disposition to appear red, but when the circumstances of manifestation occur, the chameleon acquires that disposition. In this case, an object *x* which does not have disposition D gains D when exposed to circumstance C. and subsequently exhibits manifestation M. Arguably, prior to C occurring, (A) is false: *x* does not have the disposition. However, (B) is true: if *x* were to be subject to C, *x* would exhibit M. So, this kind of case also shows that the analysis fails to state a sufficient condition for *x's* having a disposition.

Something could finkishly lack a potentiality as well. If some cloning or nanotechnology could tum something non-human into a human

fetus, and if that procedure is initiated only if that something is placed in a uterus, then that thing would, at the outset, lack the potential to be a human being. However, if it gets placed in the circumstances of manifestation, it would acquire that potential. Again, the potentiality claim $(A)^P$ would be false, but the associated conditional $(B)^P$ would be true. I suppose the super-kitten could be recast as something that finkishly lacks the potential to be a person, if those who would provide the transformative agent would do so only on the condition that the kitten gets adopted by a family that intends to raise it as a human child, teaching to it speak and so on. It would be true of the kitten "if it is nurtured and educated, it will become a person," even though we may be disinclined to say that the kitten has the potential to become a person.

2.1.2 The Revised Conditional Analysis

Lewis' revised conditional analysis (RCA) was specifically designed to overcome finks. Recall the simplified version of Lewis' analysis states:

> *x* has a disposition at time *t* to give M in C iff *x* has intrinsic property *P,* and if *x* were to be in C at time *t* and retain *P,* then *P* and C would cause M (1997: 157).

According to RCA, the activating conditions and an intrinsic property of the disposed object jointly cause the manifestation of a disposition. In a finkish case, something causes the object to lose the relevant intrinsic property, and subsequently to lose the disposition. The condition that the object retains the intrinsic property is not satisfied by objects with finkish dispositions, and so they pose no counterexample to RCA. The condition that the object must have the intrinsic property is not met when something finkishly lacks a disposition, so that counterexample is defeated as well.

While Lewis' analysis does address cases of finks, it can be contested on at least three grounds: (1) It assumes that all dispositions have causal bases; (2) It does not address the masking counterexamples: and (3) it assumes that dispositions are intrinsic properties.

I have argued elsewhere that dispositions do not necessarily have causal bases; there can be ungrounded or 'bare' dispositions (2003b). RCA fails to extend to such dispositions. I argue that it neither follows

from the concept of a disposition nor from the idea that disposition claims must have truth makers, that dispositions necessarily have causal bases. Others such as Molnar (2003) and Mumford (2005) attempt to identify a class of ungrounded dispositions in the fundamental properties of subatomic particles. While it is reasonable to think that many of the potentialities I have been talking about (the potential to be a tree, a person, or a philosopher) are grounded, perhaps fundamental particles have potentialities, and these lack causal bases. Molnar argues that the nature of these particles is exhausted by their dispositionality, and extensive experimentation has revealed no deeper structure to serve as the intrinsic properties to ground these dispositions (2003: 131-132). RCA would seem, therefore, to be inapplicable to the most fundamental properties of the physical world. Other second-order property accounts can be rejected for similar reasons.

In addition, it is acknowledged that RCA still faces the problem of masking. Consider the glass that is carefully packed. According to RCA, to say the glass is fragile is to say that it has some intrinsic property P, and if it were to be in circumstances of striking at time t and retain P, then P and striking would cause breaking. However, the carefully packed glass retains its intrinsic properties, but its intrinsic properties and the striking do not cause the glass to break.

As I have also argued elsewhere, dispositions are not necessarily intrinsic to the objects that have them (McKitrick 2003a). A property is extrinsic if perfect intrinsic duplicates can differ with respect to having it.[7] Contrary to Lewis, perfect duplicates could differ with respect to having certain dispositions; a thing can lose or acquire dispositions without changing intrinsically. Weight may be dispositional, but it is not intrinsic. The weight of an object is relative to its gravitational field. According to RCA, weight could be defined as follows:

> An object weighs one hundred pounds (it has a disposition at time *t* to exhibit the reading "100 lbs." in circumstances of standing on a standard scale) if and only if it has an intrinsic property P, and if it were to stand on a standard scale at *t* and retain P. then P and standing on the scale would cause it to exhibit the reading "100 lbs."

7. This is not a reductive analysis of "extrinsic" but is offered as a heuristic, intuitive guide to judgments about extrinsicality.

But if the object stood on the scale on the moon at *t,* its intrinsic properties plus standing on a scale would not cause a "100 lbs." reading.

Extrinsic Potentialities

As with looking for examples of extrinsic dispositions, the strategy for finding cases of extrinsic potentialities is to consider perfect intrinsic duplicates and see if they could differ with respect to potentiality attributions. So, consider an acorn with the potentiality for "treehood" and a perfect duplicate of that acorn in a different world, all by itself. This acorn is "lonely" in the sense that it is the only object in its world. If the lonely acorn lacks the potentiality for treehood, then that potentiality is extrinsic. So, does the lonely acorn have the potentiality for treehood? If the circumstances of manifestation must occur somewhere in that world in order to have the potentiality, then the lonely acorn lacks the potentiality. The lonely acorn can also lack the potential for treehood if it is in a world where the laws of nature prohibit any circumstance which would enable it to develop into a tree.

However, some philosophers think that the relevant sense in which dispositions are intrinsic is that they are "intrinsic, keeping the laws of nature fixed" (Lewis 1997). An interesting and relevant question, at any rate, is whether duplicates in the same kinds of worlds, or different parts of the same world, could differ with respect to a potentiality. It would be helpful here to consider end of life cases, where one makes claims such as: a coma victim is potentially conscious, or a terminal condition is potentially reversible. A patient might not be capable of recovering or becoming conscious, given current medical technology. However, it is possible that some future medical technology could reverse his condition. Do we want to say that the patient currently has the potential to recover? That seems misleading at best. Perhaps it would be more correct to say that they are not now potentially conscious, but if extrinsic factors were different, they would be. Then the patient's potential for recovery is an extrinsic potentiality. It is plausible that similar considerations apply if the necessary medical technologies exist, but are not practically accessible, if they are very far away or prohibitively expensive, for example. Two patients with the same condition could have different potentialities

due to the differing circumstances, and this entails that those potentialities are extrinsic.

Similar considerations apply in beginning of life cases. Perfect duplicate embryos in different circumstances could have different potentialities. For instance, consider an embryo outside of a uterus and its perfect duplicate inside of a uterus. If there are no available means for implanting the embryo into a favorable environment, then by parity of reasoning with the end of life cases, we should say that the embryo lacks the potentialities enjoyed by its duplicate inside of a uterus. Therefore, the embryo's potentiality for rationality is an extrinsic potentiality, Another thing to consider is what counts as "available means" for implanting an embryo. Surely, the medical technology must exist in this case, too. So, if we consider two duplicate frozen embryos, one in a fertility clinic with all the staff and equipment necessary for successful implantation, and the other in a remote location with no such amenities, perhaps we should say that those embryos have different potentialities. And if perfect duplicates can differ with respect to having a certain potentiality, then that potentiality is extrinsic.

Typically, those that think that causal bases are essential to dispositions are thinking of those causal bases as intrinsic (Lewis 1997). However, an alternative position is that not only can dispositions be extrinsic, but the causal bases of dispositions can be extrinsic too (Nolan 2005). So, the mistake of those that claim that intrinsic duplicates have the same disposition is not that they are only focusing on the causal basis of that disposition, but rather that they are only focusing on *part* of the causal basis of the disposition, and not taking into account the properties that are extrinsic to the disposed individual that are part of the causal basis of its disposition. In other words, if an embryo's potentiality is extrinsic, then the causal basis of its potentiality does not merely consist of the intrinsic properties of the embryo, but also includes properties of its environment.

One may argue that, if potentialities can be extrinsic properties, that is all the worse for realism about potentialities. Extrinsic properties are the quintessential "Cambridge properties," the properties that things acquire when they undergo "Cambridge changes," which are not genuine changes (Geach 1969; Shoemaker 1980). However, proponents of such a view are committed to rejecting all extrinsic properties and relations, including being married, being taller, happening

later, and standing a meter away. Perhaps some relational properties can be reductively explained in terms of intrinsic properties, but reducing all spatial and temporal properties to intrinsic properties promises to be problematic.

Taking stock of where we are, the above argument for extrinsic potentialities is presented for the purposes of resisting attempts to reduce disposition claims to conditional claims about intrinsic non-dispositional properties. Ungrounded dispositions and masks are also outstanding problems for such attempts. At this point, aspiring reductionists may want to look elsewhere.

2.1.3 Reduction by Other Accounts

Views according to which dispositions are irreducible powers cannot be used to reduce potentialities away. If such views are correct, and if potentialities just are (a type of) disposition, then potentialities are irreducible too. Second-order property accounts will not do the job either. (Recall that a second-order property account is one according to which *"x* has a disposition D to exhibit M in C iff *x* has some property P which is a causal basis for giving M in C.") As mentioned above, a second-order property account assumes that all dispositions have causal bases, a claim which has been contested. But even if we grant that potentialities have causal bases, this second-order property account is not sufficiently reductive. The causal basis is characterized as a property that "would be causally efficacious for M in C"-it would cause the disposition's manifestation in the circumstances of manifestation. In other words, what makes a property a causal basis of a disposition is its *power* to have a certain effect. But that is tantamount to saying that the causal basis is or has a dispositional property. Lacking some reductive account of what it means to say that a property is such that "would cause" a certain effect, a second-order property account seems to analyze disposition ascriptions in terms of having dispositional properties.

Another account to consider is Manely and Wasserman's PROP. Recall that PROP says *"x* is disposed to M when C iff *x* would M in a suitable proportion of C-cases"-where C-cases are possible circumstances. It matters not that some C-cases include finks or masks, as long as enough of the C-cases are cases where *x* M's. Also, it does not matter if there are some mimics; if some *y* is not disposed to Min C, but

nevertheless M's in some particular circumstances. Presumably, if we are still disinclined to say that *y* is disposed to M in C, that is because there are still too many relevant possible situations in which *y* does not M in C. Nor does it matter if the disposition is extrinsic or ungrounded, since the analysans makes no mention of bases, intrinsic or otherwise. So, it seems that we have an analysis that steers clear of many of the pitfalls that plagued other conditional analyses. Does this mean we can make sense of all our disposition and potentiality talk, while denying the existence of dispositions and potentialities?

One response is that PROP cannot deal with all of the counterexamples, particularly those that have come to be known as intrinsic finks (Ashwell 2010; Clarke 2008; Everett 2009). Johnston's shy-but-intuitive-chameleon example is one of an intrinsic fink. It is disposed to look green, but due to its intrinsic properties, it loses that disposition when people look at it. Given that description, it will not look green in the majority of the C-cases. This disposition claim *"x* is disposed to M when C" is (arguably) true, but the associated conditional *"x* would M in a suitable proportion of C-cases" is false in the case of this chameleon.

Another response is to say that this conditional analysis is neither here nor there with respect to the reality of potentialities. A conditional analysis of potentialities says something about what we mean when we say something has a potentiality. One may argue that it places no restrictions on our metaphysical views about the existence of such properties. In fact, Manley and Wasserman do not claim that PROP reduces disposition ascriptions to conditionals. They write:

> We take PROP to capture a necessary connection between dispositions and conditionals, but we withhold judgment on the priority of either side of this equation (whether metaphysical or conceptual) (2011: 4).

To say that something has a potentiality if and only if a certain conditional is true of it does not go to show that there are no potentialities any more than it goes to show that there are no true conditional propositions. On abundant (non-sparse) views of properties, a thing can have the property of being such that a certain conditional is true of it. On an extensional view of properties, for example, the set of things that a certain conditional is true of constitutes a property. Or perhaps

the reason why certain conditionals are true of a thing is *because* it has certain potentialities. In that case, the order of dependence goes in the other direction. In sum, anti-realism about potentialities has not been established by reductive analyses of potentiality claims.

2.1.4 Subjectivism

Another argument that one could level against realism about potentialities begins with the idea that potentiality claims say more about subjective human psychology than they do about any mind-independent properties. Recall some of the questions considered above: Is super-kitten a potential person? If some therapy might be developed in the future which would save someone's life were it to exist now, does that patient have the potential to recover now? Whether we answer "yes" or "no," it may be asked, on what basis do we determine our answer? Perhaps what determines our answers is our own criteria of plausibility or estimation of future possibilities. We could model a person's thinking when making potentiality judgments as follows: Consider some object and some relevant sample of its possible future stages; then arrange those future possibilities in order of your estimation of their likelihood; then, pick a threshold beyond which the possible outcome is one which you consider too unlikely to take seriously. Every future state below that threshold is one which the object has a potentiality for.

For example, consider the acorn. Possible future states might include getting crushed, becoming an oak tree, becoming a table, and becoming a chicken. Depending on your bounds of plausibility, you might say that the acorn has the potential to become an oak tree, but not a table or a chicken. But others may have different orderings of likelihood, and put the threshold in a different place, and so make different judgments as to a thing's potentialities. In this regard, something having a potentiality is like it being something that inspires expectation, hope, or dread-all descriptions of a thing in terms of the psychological states of observers. If this is the right way to understand our potentiality talk, then whether a thing has a certain potentiality will be relative to individuals, based on their subjective probabilities and standards of plausibility.[8]

8. Thanks to Matthew McKitrick for suggesting this line of argument.

This would, in effect, be another reductionist strategy. It amounts to saying that if a potentiality claim is true, it is because of the psychological states of the person making it, and not because of the existence of any property possessed by the object that they are making the claim about. One can find inspiration for such an argument in Hume, who famously locates the origin of the idea of causation in a feeling of expectation, as well as more recent theories that regard causal claims as implicitly contrastive or value-laden (Hume 1978; Maslen 2004; Kagan 1988). If whether 'A caused B' depends on expectations, salience of contrast classes, or moral judgments, and these things differ from person to person, causal powers, and by implication potentialities, cannot be regarded as objective, mind-independent properties.

To respond to such an anti-realist argument, note an implication of the view being suggested. If my claim that something has a potentiality is merely a report about my subjective probabilities, then as long as my words accurately reflect my psychological state, I cannot be mistaken. If it seems to me that being a chicken is a possible future state of an acorn, and I do not regard that possibility as too far out, then when I say "an acorn is a potential chicken," I am saying something true. But it seems that people can disagree about what potentialities things have, and that they are not merely talking past each other, each reporting on their own subjective probabilities.

Another consideration to keep in mind is the distinction between epistemic potentiality and metaphysical potentiality. Recall that when one thinks that some claim has some chance of being true, one may express that idea by saying "it is potentially true." However, that is not necessarily to attribute a potentiality to anything. The idea that attributing a potentiality to something is a report of one's subjective probability treats all potentiality claims as if they were about epistemic potentiality. But it is not clear that this is so. It is worth pointing out the analogy to chance. Many claims about the chance of some event occurring can be appropriately interpreted as claims about subjective probability, based on one's epistemic situation. This can, of course, deviate from the objective chance of the event occurring. If I flip a fair coin once and conceal the outcome from you, from your point of view, it has a 50% chance of being heads up, but in terms of objective probability, once the flip is over, it either has a 0% or 100% chance of being heads up.

Just as we can interpret "chance-talk" as being about subjective probability, objective probability, or some mixture of the two, so we can understand "potentiality-talk" as sometimes epistemic, sometimes metaphysical, and sometimes a mixture. In other words, if! say *"x* is potentially F" I might mean: "For all I know, *x* is F"; "There are circumstances in which *x* can become F"; or "For all I know, there are circumstances in which *x* can become F." Where the threshold of plausibility judgment comes in is how to interpret the "there are circumstances" Part of the metaphysical claim. What does it take for it to be true that "there are circumstances in which *x* can become F"?

For example, in order for a fetus to be potentially rational, there must be circumstances in which it would become rational. But in what sense is it the case that "there are" such circumstances? Since it is possible to possess this potential without manifesting it, it cannot be the case that these circumstances must actually obtain for the particular embryo to be potentially rational. However, saying that there are such circumstances, as long as such circumstances are logically or metaphysically possible, would allow too many things to count as potentially rational. Even given a metaphysically possible scenario in which rocks are turned into rational beings, we want to say embryos are potentially rational in the actual world while rocks are not. So, the circumstances which enable an embryo to become rational must be at least physically possible. We might want to place more restrictions on the range of possible circumstances and say that they must not only be possible in this world, but that circumstances of this kind are instantiated somewhere in this world, or that they are not too remote or unlikely to obtain.

I think that ordinary uses of "potential" underdetermine how to proceed here. If a philosopher wants to employ a more technical concept, "potentiality," it would behoove her to clarify what range of possible circumstances are relevant to her potentiality attributions. Given a clarification of the concept, I see no reason to think that whether such a concept applies to a thing is merely a subjective matter.

2.2 The Eleatic Principle and the Inert Dispositions Thesis

Another possible reason for thinking that potentialities are not real is the belief that potentialities run afoul of the Eleatic Principle-to be

real is to have causal powers. On the face of it, this seems strange: If potentialities are dispositions and dispositions are powers, who would think that powers are powerless? But proponents of such arguments are not thinking of dispositions as irreducible powers, but are typically thinking of them as second-order properties (Prior et al. 1982; Jackson 1995, 1996; Block 1990; Kim 1993; Rives 2005). If having a disposition is a matter of having some other property, then arguably dispositions are derivative and causally irrelevant. If this "inert dispositions thesis" and the Eleatic Principle are correct, dispositions, and by implication, potentialities, are not real.

Two common strategies supporting the Inert Dispositions Thesis are analyticity arguments and exclusion arguments. According to analyticity arguments, there is an analytic or necessary connection between a disposition and its manifestation, and this goes to show that there is no causal connection. According to exclusion arguments, manifestations of dispositions already have sufficient causes, and this excludes dispositions from playing any causal role. However, as I will explain in this section, these arguments do not succeed (McKitrick 2004).

I have already raised some problems for second-order property approaches to reductively analyzing dispositions. But though I argue that some dispositions are ungrounded, I have left open the possibility that others have causal bases, so the causal relevance and thus the ontological status of those properties is challenged by these arguments. By the same token, I would be concerned to reply to dispositional realists who claim, for similar reasons, that only *fundamental* powers are genuine (Bird 2007; Molnar 2003: 27).

2.2.1 Analyticity Arguments

According to an analyticity argument, there is an analytic relation between a disposition and a manifestation, and this is evidence that there is no causal connection between them. Any adequate definition of a disposition will refer to its characteristic manifestation. For example, "fragility" is defined by reference to breaking or shattering. So, there is a definitional, conceptual, or logical connection between a disposition term and an event-type-between 'fragility' and breaking, for example. "Fragile objects tend to break when struck" is analytic (if anything is). It is further assumed that causal claims are contingent,

and therefore not analytic. It follows that, if a statement is analytic, it is not a causal statement. Consequently, "The glass broke because it was fragile" cannot be a causal claim, and so fragility must be causally inert. By the same reasoning, a potentiality is not the cause of its actualization; the acorn's potential to become a tree is not a cause of it becoming a tree.

Such analyticity arguments have long been disputed (Davidson 1980: 14). Causal connections between events hold independently of our descriptions of them. If "the cause of e caused e" is analytic, that does not go to show that the cause of e did not cause e. A similar point can be made in terms of properties. The analyticity of the claim "The property that was causally efficacious for e was causally efficacious for e" should not lead us to think that the property that was causally efficacious for e was *not* causally efficacious for e.

According to more modest versions of an analyticity argument, our sense that the disposition is relevant to the manifestation is explained by an analytic connection, and this leaves us with no reason to suppose a causal connection holds as well. This is what Block suggests when he writes:

> The fact that dormitivity is sufficient for sleep is perfectly intelligible in terms of this logical relation. What reason is there to suppose that there must *also* be a nomological relation between dormitivity and sleep? (1990: 157).

The quick answer to Block's rhetorical question is that our language can track causal connections. Examples of this are familiar: sunburn is caused by excessive exposure to sunlight; lethal injections and fatal accidents cause death.

A related argument for the Inert Dispositions Thesis appeals to Hume's Principle that there are no necessary connections between distinct existences. According to Frank Jackson, to allow that fragility causes breaking upon dropping

> would be to allow that there are properties that have causal powers essentially: in every world the property of having the property or properties responsible for breaking on dropping in that world is possessed only by objects which are such that were they dropped they would break. There is no way that

> the second-order property can be instantiated without the relevant causal power being instantiated. So, if we are to respect Hume's insight, we must deny that fragility itself does the causing of the breaking … (1995: 257).

To assess this argument, one should first consider what it means to "respect Hume's insight." As I interpret Hume, his argument against necessary connections between distinct existences goes as follows:

(1) If one can conceive of A without B, then there is no necessary connection between A and B.
(2) For any distinct existences A and B, one can always conceive of A without B.
(3) Therefore, there are no necessary connections between distinct existences (1978: 79).

If you were to discover two distinct existences which are such that you cannot conceive one without the other, that would be a counter-example to premise (2). But perhaps Jackson takes himself to have conceived of a case of a necessary connection between distinct existences-the one which would obtain if fragility had the power to cause breaking. But instead of taking this as a counter-example to Hume's Principle, he assumes the principle in a modus tollens argument against the possibility he has conceived. Jackson's argument can be put like this:

i. There are no necessary connections between distinct existences.
ii. 'Fragility' and 'the power to cause breaking' are distinct existences.
iii. If fragility had the power to cause breaking, there would be a necessary connection between 'fragility' and 'the power to cause breaking.'
iv. Therefore, fragility does not have the power to cause breaking.

Jackson, then, faces a dilemma with respect to Hume's argument above. Either Jackson cannot conceive of 'fragility' without 'the power to cause breaking,' thus contradicting Hume's premise (2), or he can

conceive of 'fragility' without 'the power to cause breaking,' and given Hume's premise (1), there is no necessary connection between 'fragility' and 'the power to cause breaking,' contradicting Jackson's own premise (iii). The two arguments are not mutually consistent. In short, Jackson employs Hume's Principle in an argument which is inconsistent with Hume's own argument for the principle, and Jackson gives us no independent reason to accept it.

Even if we accept Hume's Principle on other grounds, in order for dispositional properties with causal powers to run afoul of it, a disposition and its causal power must be distinct existences. But it is not clear that a thing's fragility and its power to cause breaking are distinct existences. Furthermore, even if this argument shows that 'fragility' is not causally relevant to breaking, there is another disposition mentioned in the argument, namely 'the power to cause breaking,' whose causal relevance is never doubted. So, even if Jackson's argument is successful against fragility, it does not stand as an argument against causally relevant dispositions generally.

In sum, neither the straightforward Analyticity Argument, nor Jackson's appeal to Hume's Principle, succeed in showing that dispositions are causally inert or unreal. Now, let us tum to a different argumentative strategy for the Inert Dispositions Thesis—exclusion arguments.

2.2.2 Exclusion Arguments

Exclusion arguments are familiar in the literature on mental causation. Consider mental property M and physical property P, which are candidates for being causally efficacious with respect to a brain event with mental property M* and physical property P*. Jaegwon Kim argues that M has no causal powers of its own:

> P is doing all the causal work. and M's causation of P*, or of M* turns out to be derivative from P's causal powers. Thus. M has no causal powers over and beyond those of P ... (1993: 353).

Similarly, Prior, Pargetter, and Jackson (hereafter PPJ) support the Inert Dispositions Thesis with an exclusion argument. They write that since the causal basis and the circumstances of manifestation are sufficient for the manifestation, "there is nothing left for any other

properties of the object to do" (1982: 255). These exclusion arguments target second-order properties generally. It is claimed that the base properties are causally efficacious for a certain event, and this excludes the second-order property from being causally efficacious as well. If the circumstances of manifestation and the base properties are sufficient for the manifestation, then it is thought that all other properties must be inert.

PPJ's (1982: 255) argument is typical. It can be summarized as follows:

a. The Causal Thesis: Every disposition has a causal basis.
b. The Distinctness Thesis: Causal bases are distinct from their attendant dispositions.
c. When a disposition's manifestation occurs, its causal basis and its circumstances of manifestation are its jointly sufficient causes.
d. The Exclusion Principle: If the instantiation of a set of properties is sufficient to cause an effect, then all other properties are causally inefficacious with respect to that effect.

Therefore,

e. Dispositions are causally inefficacious.

Suppose a particular causal basis for a potentiality and the properties of the circumstances of manifestation are sufficient for the manifestation. It would follow from the Exclusion Principle that the potentiality is causally irrelevant, and by the Eleatic Principle, the potentiality is not real.

In support of the Exclusion Principle, Kim says "The general principle of explanatory exclusion states that two or more complete and independent explanations of the same phenomenon cannot coexist" (1993: 250). PPJ succinctly echo "a complete causal explanation excludes competitors" (1982: 255). Proponents of the Exclusion Principle say that to deny it is to allow for spurious overdetermination. Denying the Exclusion Principle amounts to saying that both a potentiality and its causal basis are each sufficient for the effect, given the circumstances of manifestation. If this happened every time a potentiality was actualized, we would have, as Block says, "bizarre, systematic over-determination" (1990: 159).

Standardly, an event *e* is causally overdetermined if two or more distinct events occur, each of which is sufficient to cause *e*. Perhaps there is something wrong with postulating too many coincidences. And if a great many effects systematically had two distinct events that were sufficient for causing them, that would run counter to our understanding of the causal structure of the world. Maybe that would be too high a price to pay for real potentialities. However, one should not overlook the fact that these considerations and intuitions about overdetermination apply to two (or more) *events* overdetermining an effect. But what we are concerned with in the case of potentialities and causal bases are the properties of a single individual. It is not clear what it means to say an effect is overdetermined by an object's *properties*.

The Exclusion Principle asks us to single out one special set of properties that are minimally sufficient for an effect, and declare the rest causally inert. This may prove difficult to do, especially when properties are so intimately related, as a potentiality is to its causal basis. Furthermore, it is not clear that we have any compelling reason to suppose that, for any effect, there is only one minimally sufficient set of causally efficacious properties. Consider the following propositions: The cape has surface reflectance property R; the cape is red21 ; the cape is crimson; the cape is red; the cape is colored (Yablo 1992: 257). Now, suppose that each proposition entails its successor. **It** follows from the Exclusion Principle that, if one of the above properties is causally efficacious for a certain effect, all of the others are causally inert with respect to that effect. However, it seems reasonable to think, as Funkhouser claims: "Instances of determinables and their determinates do not causally exclude each other" (2006: 3). If that is not right, it is not clear what would determine the level of specificity at which the causal action is going on. One might argue, as Kim does at times, that all of the causal action happens at the most fundamental level (1993). Such an assumption has serious counter-intuitive consequences, for example, that all of the macro-properties we regularly observe are causally impotent. Furthermore, assuming that all causal action happens at the level of fundamental properties may not serve the Inert Dispositions Thesis, since it seems likely that fundamental properties are dispositional.

3 Conclusion

I have argued that potentialities are properties, specifically dispositions. Metaphysical accounts of properties and of dispositions provide resources for a variety of views about the nature of potentialities, according to which some potentialities are genuine, real, and existent. An anti-realist might argue that potentiality claims reduce to claims about other sorts of entities, or that potentialities cannot be real because they have no causal powers. I have defended realism about potentialities by countering reductionism and the Inert Dispositions Thesis.

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